CONSTRUCTION SPECIFICATION

NV-61. LOOSE ROCK RIPRAP

1. SCOPE

The work shall consist of furnishing, transporting, and placing rock riprap, including filter, bedding or geotextile materials where specified, in the construction of loose rock riprap revetments, blankets, rock toes, crossings, rock chutes, channel linings and other similar structures.

2. QUALITY OF MATERIALS

Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to subrounded in shape. The least dimension of each individual rock fragment shall be not less than one-third the greatest dimension of the fragment. It should also be free from dirt, clay, sand, rock fines and other materials not meeting the gradation limits. Rock shall be excavated, selected and handled as necessary to met the grading requirements on the drawings. The rock shall be obtained from specified sources or sources as approved by the Technician.

Rock sources used for streambank protection, lined waterways, rock chutes or other similar major projects (Job Class II and above) shall be tested prior to use. Rock for equipment or cattle channel crossings, access roads, heavy use area protection or similar minor structures need not be tested.

Representative samples of rock requiring testing shall conform to the following requirements:

Bulk Specific Gravity (saturated surface-dry basis). Not less than 2.50 when tested in accordance with ASTM Specification C 127 on samples prepared as described for soundness testing.

Absorption. Not more than two (2) percent when tested in accordance with ASTM Specification C 127 on samples prepared as described for soundness testing.

Soundness. The weight loss in five (5) cycles shall not be more than 28 percent when tested by the sodium sulfate soundness test method. Losses in excess of twenty (20) percent are acceptable only when the design D_{50} rock size has been increased by ten (10) percent for 20-23.9 percent loss or twenty (20) percent for a loss of 24-28 percent.

Rock Riprap from igneous or metamorphic may be used without testing. Rock material of these types are, but not limited to, granite, basalt and quartzite. The Technician shall approve sources of these rock types prior to use.

3. METHODS OF TESTING

Bulk Specific Gravity and Absorption shall be determined by ASTM Method C 127 on samples prepared as described for soundness testing.

Rock Cube Soundness. Soundness testing shall be performed by ASTM Method C 88 for coarse aggregate modified as follows:

The sodium sulfate soundness test shall be performed on a test sample of 5000 $\pm$ 300 grams of rock fragments, reasonably uniform in size and cubical in shape and weighing, after sampling, approximately 100 grams each. The test sample shall be obtained from rock samples that are representative of the total rock mass, as noted in ASTM Specification D 4992, and that have been sawed into slabs as described in ASTM Specification D 5121. The samples shall be further reduced in size by sawing the slabs into cubic blocks. The thickness of the slabs and the size of the sawed blocks shall be determined by the available test apparatus and as necessary to provide, after sawing, the approximate 100 gram samples.

Due to internal defects, some of the cubes may break during the sawing process or during the initial soaking period. Cubes that break during this preparatory process shall not be tested. Such breakage, including an approximation of the percentage of cubes that break, shall be noted in the test report.

After the sample has been dried, following completion of the final test cycle and washing to remove the sodium sulfate, the loss of weight shall be determined by subtracting from the original weight of the sample the final weight of all fragments which have not broken into three or more fragments.

The test report shall show the percentage loss of the weight and the results of the qualitative examination.

4. GRADATION

The gradation of the rock riprap and filter or bedding material shall be as shown on the drawings.

5. SUBGRADE PREPARATION

The subgrade surfaces on which the riprap, filter or bedding material is to be placed shall be cut or filled and graded to the lines and grades as shown on the drawings or as directed by the Technician. When fill to subgrade lines is required, it shall consist of approved materials and shall be compacted as specified in Construction Specification NV-23, Earthfill.

Riprap, filter, bedding or geotextile shall not be placed until the foundation preparation is completed, and approved by the Technician.

FILTER AND BEDDING

Filter or bedding material, when required, shall be spread uniformly on the prepared subgrade surfaces to the depth shown on the drawings. The surfaces of the layers shall be finished reasonably free of mounds, dips or windrows and shall meet the gradation shown on the plans or as specified in Construction Specification NV-24, Drainfill.

Geotextile, when required, shall meet the requirements shown on the drawings and as specified in Construction Specification NV-95, Geotextile.

6. PLACING ROCK RIPRAP

The rock riprap shall be placed by equipment on the surfaces and to the depths specified. The rock riprap shall be installed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The rock for riprap shall be delivered and placed in a manner that will ensure that the riprap in-place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. Some hand placing may be required to provide a neat and uniform surface. Rock riprap shall also be placed in a manner to prevent damage to structures. Hand placing may be required to prevent damage to any new or existing structures.